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Part 1. Report Cover

- A. Report Number: DODPOPHM/USA/DOD/AF82/TR90030
- B. Title: "Performance Oriented Packaging Testing of
Fiberboard Container, PPP-B-636"

Responsible Individual: M. A. Garcia

Performing Activity: Packaging Management Branch
DSTD, Bldg. 169
Kelly AFB, Texas 78241-5000

Date: 26 July 1990

Report Type: Interim

* Final *

Specific Authority

- C. Sponsoring Organization: SA-ALC/DSTD
Kelly AFB, Texas 78241-5000

Sponsor's Reference:

DTIC
ELECTE
AUG 01 1990
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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION / AVAILABILITY OF REPORT STATEMENT A - APPROVED FOR PUBLIC RELEASE		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
4. PERFORMING ORGANIZATION REPORT NUMBER(S) DODPOPHM/USA/DOD/AF82/TR90030			7a. NAME OF MONITORING ORGANIZATION		
6a. NAME OF PERFORMING ORGANIZATION PACKAGING MANAGEMENT BRANCH	6b. OFFICE SYMBOL (If applicable) DSTD	7b. ADDRESS (City, State, and ZIP Code)			
6c. ADDRESS (City, State, and ZIP Code) SA-ALC/DSTD KELLY AFB TX 78241-5000		9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER			
8a. NAME OF FUNDING / SPONSORING ORGANIZATION	8b. OFFICE SYMBOL (If applicable)	10. SOURCE OF FUNDING NUMBERS			
8c. ADDRESS (City, State, and ZIP Code)		PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.	WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification)					
12. PERSONAL AUTHOR(S) MIGUEL A. GARCIA					
13a. TYPE OF REPORT FINAL	13b. TIME COVERED FROM _____ TO _____	14. DATE OF REPORT (Year, Month, Day) 26 July 1990		15. PAGE COUNT 11	
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)			
FIELD	GROUP	SUB-GROUP	PERFORMANCE ORIENTED PACKAGING OF HAZARDOUS MATERIALS. (SDO)		
19. ABSTRACT (Continue on reverse if necessary and identify by block number)					
<p>→ The container and its contents were subjected to the drop test and stacking test in accordance with the requirements specified in the UN Recommendations on the Transport of Dangerous Goods, Fifth Edition, dated 1988. There were no indications of damage, deformation, or deterioration on the test specimens which would adversely affect transportation safety, reduce their strength, or cause instability. The test specimen complies with the special UN requirements and were successfully tested for Packing Group I. <i>Keywords:</i></p>					
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION		
22a. NAME OF RESPONSIBLE INDIVIDUAL W. R. HOLMES			22b. TELEPHONE (Include Area Code) (512)925-6511		22c. OFFICE SYMBOL DSTD

Part 3. Data Sheet

A. Exterior Shipping Container

Type: Box

UN code: 4G

Specification Number(s):PPP-B-636,Style RSC,Type CF,
Class WR,Variety SW,Grade V3c

Material:PPP-F-320, corrugated fiberboard

NSN: 8115-00-265-7059

Capacity (I.D.): N/A

Tare Weight: 0.113 kg. (0.25 lb.)

Dimensions (O.D.): 10.92 cm. x 10.92 cm. x 11.43 cm.
(4.3 in. x 4.3 in. x 4.5 in.)

Closure (Method/Type): Taping

Banding: N/A

Banding Specification Number(s): N/A

Additional Description: N/A

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By _____	
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Part 3. Data Sheet (continued)

B. Inner Packaging of Combination Packaging

Specification Number(s): Preservation submethod IC1 in
accordance with Mil-P-116.
L-P-378 wrap
Mil-B-121 barrier bag
PPP-C-1797 cushioning material

Type: 5M2

Material: Paper, water proof

NSN: N\A

Capacity: N\A

Tare Weight: 0.45 kg. (0.1 lb.)

Closure (Method/Type): Heat seal bag

Closure Specification Number(s): Mil-P-116.

Additional Description: Submethod IC1 consists of
wrapping the item in L-P-378 material, cushioning
with PPP-C-1797 and heat sealed in a Mil-B-121
barrier bag. Additional cushioning material is added
around the bag before placing into the exterior shipping
container.

Part 3. Data Sheet (continued)

C. Actual Products: Used

* Not Used *

Name: Magnet, permanent

NSN: 5999-00-351-5369 PS

Proper Shipping Name: Magnetized material

United Nations Number: 2807

United Nations Packing Group: I II

* III *

Hazard Class: ORM-C

Physical State: *****
* solid * liquid gas

Amount Per Container: N/A

Item Weight: 0.045 kg. (0.10 lb.)

Density/Specific Gravity: N/A

Drop Height: N/A

Stacking Weight/Force: N/A

Vapor Pressure: N/A

Flash Point: N/A

Altitude: 690 Ft. above sea level

Air Pressure: 29.92 in. of Hg. at 32 degrees F.

Part 3. Data Sheet (continued)

D. Test Product: * Used * Not Used

Name: metal weight
United Nations Packing Group: I II *****
* III *

Physical State: * solid * liquid gas

Amount Per Container: N/A
Gross Weight: 0.204 kg. (0.45 lb.)
Density/Specific Gravity: N/A
Drop Height: 1.8 m (70.875 in.)
Stacking Weight/Force: 5.9 kg. (13 lb.)
Test Pressure (liquids only): N/A
Consistency/Viscosity: N/A
Flash Point: N/A
Altitude: 690 ft. above sea level
Air Pressure: 29.92 in. of Hg. at 32 degrees F

E. Test Applicability: Based on the drop height and stacking weight computed, this test report is applicable for the NSN: 5999-00-351-5369 PS. This container and its contents were successfully tested for Packing Group I.

Part 4. Introduction:

1. The exterior shipping container used to package NSN: 5999-00-351-5369 PS, permanent magnet, is a fiberboard container, style RSC, type CF, class WR, variety SW, and grade V3c.
2. The method of preservation used is a submethod IC1 in accordance with Mil-P-116. It consists of wrapping the item in L-P-378 material and cushioning with PPP-C-1797 before placing it into a Mil-B-121 barrier bag and heat sealed.
3. One container was fabricated for the drop test. The container was used for all the flat drops and the corner drop. A drop tester was used in conjunction with a 1/2 inch steel impact plate.
4. The stack test was performed on the same container used for the drop test. The stacking weight was calculated using the following formula.

$$W=[m(118-h)]/h \quad \text{or} \quad W=[m(3000-h)]/h$$

Where W=constant load in kilograms or pounds.

m=container gross weight in kilograms or pounds.

h=package height in millimeters or inches.

5. The leakproofness test, internal hydraulic pressure test, and the cooperage test is not applicable for this fiberboard container.
6. The fiberboard containers were conditioned in the test lab for 24 hours. The average temperature recorded in a 24 hour period was 24.8 degrees C. (76.6 degrees F.), with the relative humidity of 79.5 %. The relative humidity exceeded the requirements of the Orange Book, making the test conditions for the fiberboard more extreme.

Part 5. Test Required/Performed:

A. Drop Test - One drop per container

Boxes: Five Drops - 1st Drop: Flat on the bottom
2nd Drop: Flat on the top
3rd Drop: Flat on the long side
4th Drop: Flat on the short side
5th Drop: On a corner

Drop Height: Packing Group I - 70.9 in. (1.8m)
Packing Group II - 47.2 in. (1.2m)
Packing Group III - 31.5 in. (0.8m)

The container shall strike a target which shall be rigid, nonresilient, flat and horizontal steel surface.

B. Stacking Test - One test per container

The container shall be subjected to a compression force applied to the top surface equivalent to the total weight of identical packages which might be stacked on it during transport. The minimum height of the stack including the test sample shall be 3 meters (9.8m). The stack test should be maintained for 24 hours.

The containers shall be tested for stability by placing two loaded containers on top of the test samples for at least 1 hour.

Note: Fiberboard containers should be conditioned for a minimum of 24 hours prior to testing. Standard conditions shall be 23 plus or minus 2 degrees C (73 plus or minus 2 degrees F), and 50 plus or minus 2% relative humidity.

C. Leakproofness Test: Not Applicable for wooden or fiberboard containers carrying solids.

D. Internal (Hydraulic) Pressure Test: Not applicable for wooden or fiberboard containers carrying solids.

E. Cooperage Test: Not applicable for wooden or fiberboard containers carrying solids.

Part 6. Criteria for Passing the Test: (UN Criteria)

Pass/Fail

- A. Drop Test: Each packaging containing liquid should be leakproof when equilibrium has been reached between the internal and external pressures, except for inner packagings of combination packagings when it is not necessary that the pressures be equalized.

Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by the inner packaging or inner receptacle (e.g. plastic bag), even if the closure is no longer sift-proof.

The packaging or outer packaging of a composite or combination packaging should not exhibit any damage liable to affect safety during transport. There should be no leakage of the filling substance from the inner receptacle or inner packaging(s).

Neither the outermost ply of a bag nor an outer packaging should exhibit any damage liable to affect safety during transport. A slight discharge from the closure(s) upon impact should not be considered to be a failure of the packaging provided that no further leakage occurs.

No rupture is permitted in packagings for goods of Class 1 which would permit the spillage of loose explosive substances or articles from the outer packaging.

- B. Stacking Test: No test sample should leak. In composite packagings or combination packagings, there should be no leakage of the filling substance from the inner receptacle or inner packaging. No test sample should show any deterioration which would adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages. In instances (such as guided load tests of drums and jerricans) where stacking stability is assessed after completion of the test, this may be considered sufficient when two filled packagings of the same type placed on each test sample maintain their position for one hour. Plastics packagings should be cooled to ambient temperature before the assessment.

Part 6. Criteria for Passing the Test: (UN Criteria) continued

- C. Leakproofness Test: Not applicable for wooden or fiberboard containers.
- D. Internal Pressure (hydraulic) Test: Not applicable for wooden or fiberboard containers.
- E. Cooperage Test: Not applicable for wooden or fiberboard containers.

Part 7. Discussion:

- A. Drop Test: The test specimen was tested for Packing Group I drop height of 1.8 m (70.875 in.). The container did not sustain any form of damage on the four flat drops. On the corner drop, the container was slightly bent but not enough to cause failure.
- B. Stacking Test: The total weight used for the stacking test was 0.204 kg.(0.45 lb.) and was maintained for a period of 24 hours. There were no signs of failure to the container. The containers were successfully tested for stability for 1 hour.
- C. The test samples used for the drop test and stacking test successfully passed.

Part 8. Test Results:

A. Drop Test	***** * Pass * *****	Fail	N/A
B. Stacking Test	***** * Pass * *****	Fail	N/A
C. Leakproofness Test	Pass	Fail	***** * N/A * *****
D. Internal (Hydraulic) Pressure Test	Pass	Fail	***** * N/A * *****
E. Cooperage Test	Pass	Fail	***** * N/A * *****

In order to be certified, the container must pass all applicable tests

Part 9. Markings on container for NSN: 5999-00-351-5369 PS

(u) 4G/X0.204/S/**
(n) USA/DOD/AF82

** denotes the last two digits of the year during which the packaging was manufactured.

Part 10. References:

- A. Recommendations on the Transport of Dangerous Goods, Fifth Revised Edition, United Nations, New York, 1988.
- B. Federal Test Method Std. No. 101C, 13 March 1980.
- C. DOD Hazardous Materials Packaging Test Plan.